UDK 677.072-486.1

DEVELOPMENT OF TECHNOLOGY FOR PRODUCING YARN FROM BLENDS OF COTTON AND NITRON FIBER

РАЗРАБОТКА ТЕХНОЛОГИИ ПОЛУЧЕНИЯ ПРЯЖИ ИЗ СМЕСИ ХЛОПКОВОГО И НИТРОНОВОГО ВОЛОКНА

Rajapov, O. O., Gafurov, Q. G.

Tashkent Institute of Textile and Light Industry, Uzbekistan, e-mail: odil_2005@rambler.ru

Ражапов, О. О., Гафуров, К. Г.

Ташкентский институт текстильной и легкой промышленности, Узбекистан

ABSTRACT

COTTON, NITRON, LINEAR DENSITY, ELONGATION, FIBER, STAPLE LENGTH, BREAKING LOAD

The article deals with the properties of synthetic nitron fiber. The possibility of its processing of the blends with cotton fiber is investigated and the advantages of blended yarns are revealed.

АННОТАЦИЯ

ХЛОПОК, НИТРОН, ЛИНЕЙНАЯ ПЛОТНОСТЬ, УДЛИНЕНИЕ, ВОЛОКНО, ШТАПЕЛЬНАЯ ДЛИНА, УДЕЛЬНАЯ РАЗРЫВНАЯ НАГРУЗКА

В статье рассматриваются свойства синтетического волокна нитрон. Исследуются возможности его переработки смеси с хлопковым волокном и выявлены преимущества по показателям смесовой пряжи.

One of the most promising areas for the development of the textile and light industry is the production of yarn, fabrics and knitted fabrics, and products made from chemical and natural fiber blends.

Among the large tonnage of chemical fibers used in textile processing mixed with natural fibers, the leading place is occupied by polyamide (Capron), polyester (Lavsan) and polyacrylonitrile (Nitron) fibers. Threads from these fibers are processed both in pure form, and in blends with other fibers. They have found wide application in knitted, silk, woolen and in other branches of the textile industry. The obtained filaments fromblends of nitron and cotton fiber give the fabrics and knitted fabrics a new complex of properties: resistance to abrasion, form stability, small shrinkage and others. Using them as weft fibre gives the products the necessary softness, elasticity, hygiene, pleasant feel. The main attention in this case should be given to improving the appearance of knitted fabrics and fabrics due to the exnitronsion of the color range, the use of dyes of various classes and the use of more

diverse patterns in packing.

As it is known, nitron fibers are highly resistant to light and weathering, and by these parameters they exceed almost all known textile fibers.

Features of mechanical properties of staple nitron fibers predetermine their textile and technological behavior characteristics in spinning processes [1].

Synthetic nitrone fiber in many cases is a substitute for wool and cotton. It has a number of properties, due to which nitron is a valuable raw material in the textile industry. Nitron fiber is used with other fibers in different ratios.

Nitron fiber has high strength, but it is somewhat lower than that of polyamide and polyester. The advantage of the nitron is its low density (1.17 g/sm^3). The breaking elongation of the nitron is 16-20 %. The nitron fiber and its copolymers have a high initial modulus of elasticity, that is, they resist tensile stresses with multiple loads, so that the appearance of the products from these fibers is restored after crushing. At normal relative humidity (65 %), the fiber sorbs moisture from the air in volume less than 1 %. Nitron fiber in the wet state slightly loses its strength.

To improve the technological properties of the fiber and reduce static charges, an experiment was performed in which the nitron was treated with an antistatic «triamon». The processed nitron fiber is subjected to mixing with a cotton fiber selection C-4727 (table 2).

Table 1 – Physical and mechanical properties of fiber nitron

№	Name of indicators	Indicator values
1	Linear density, tex	0.17
2	Tenacity of fiber, mN/tex	324
3	Elongation of fiber at break, %	27
4	Tenacity of fiber with a loop break, mN/tex	81
5	Average staple fiber length, mm	37.8
6	Coefficient of variation of staple fiber length, %	2.22
7	Number of twists per 10 mm	3.7

Experimental studies were carried out in the conditions of the educational production laboratory of the Department «Technology of spinning» according to the methodology set forth in the «Instruction for technical control in cotton spinning».

Table 2 – Physical and mechanical properties of cotton fiber C-4727

№	Name of indicators	Indicator values
1	Staple length, mm	33.1
2	Linear density, tex	0.180
3	Breaking load of fiber, cN	5.0
4	Tenacity of fiber, cN /tex	28.0
5	Content of short fibers, %	8.2

Sampling from the general population was performed according to the procedure with a confidence probability of P = 0.95. All tests were carried out on three surfaces.

Yarn of linear density 18.5 tex was produced on the «Trutzschler» equipment: bale opener – BO-C; condenser – LVSA; baking powder – BE-963; three drum cleaners – CVT-3; aerodynamic cleaner – DX; carding machine – DK-903; drawing machine - HSR-1000; roving machine – Zinser-668; spinning machine – Zinser-350, and with a different blends ratio.

As the first component of the raw material for the production of blended yarn, cotton fiber of type V, sort I of selection C-4727.

I option: cotton fiber 83 %
nitron fiber 17 %

II option: cotton fiber 67 %
nitron fiber 33 %

When carrying out experiments according to the technical control in cotton spinning, the parameters of semi-finished products and yarn were checked, which were then compared to the normative indexes.

Samples of yarn were subjected to tests for determining their physical and mechanical properties. The results of testing a linear density of 18.5 tex yarn are shown in Table 3.

Analysis of the data in the table shows that cotton-nitron yarn has a greater uniformity across the tensile load values. Tenacity has almost equal values. The main characteristic of the finished yarn is the quality index, which, as can be seen from the table, cotton yarns II as well as cotton yarns I, respectively, have 28.0 and 20.0 % corresponding to the first grade. The breakage of cotton yarn is 10 % below normal, and cotton yarn is 11 % higher than normal. It should be noted that all tests were carried out according to the developed regulation of equipment for cotton fiber.

Thus, the results of the experimental tests showed that cotton-nitron yarn has higher quality indexes.

Table 3 – Physical and mechanical properties of yarn

№	Indicators	The norm in accordance with GOST - 9092-81	Option		Deviation, %	
			I	II	I	II
1	The linear density, tex	18.5	18.7	18.6	+2.0	+1.0
2	Tenacity, cN/tex	I sort– 11.5 II sort – 10.6 III sort – 9.8	11.6	11.3	+1.0	-2.0
3	Coefficient variation of tenacity, %	I sort – 13.8 II sort – 16.2 III sort – 18.8	11.2	9.9	-19.0	-29.0
4	Level of quality	I sort – 0.83 II sort – 0.66 III sort – 0.52	1.03	1.14	+20.0	+28.0

REFERENCES

1. Перепёлкин, К. Е. Современные химические волокна и перспективы их применения в текстильной промышленности. Ж.Рос.хим.об-ва им.Д.И.Менделеева – 2002, т.XLVI - №1. С.31-48